48. (New) The electronic system of claim 45, wherein the high aspect ratio hole is formed by an anodic etch technique.

49. (New) The electronic system of claim 45, further comprising a metallic mirror lining an inner surface of the high aspect ratio hole.

50. (New) The electronic system of claim 49, wherein the metallic mirror lining is deposited by a self-limiting deposition process to form a reflective surface that is substantially uniform.

51. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer;

at least one optical waveguide formed in a high aspect ratio hole that extends through the thickness of the at least one semiconductor wafer; and

a reflective material formed on an inner surface of the high aspect ratio hole.

52. (New) The electronic system of claim 51, wherein the reflective material comprises at least one layer of a highly reflective material to form a mirror-like surface.

53. (New) The electronic system of claim 52, wherein the highly reflective material comprises at least one layer of a metal.

54. (New) The electronic system of claim 53, wherein the at least one layer of a metal comprises at least one of tungsten and aluminum.

55. (New) The electronic system of claim 51, wherein the reflective material comprises:

a layer of tungsten formed on the inner surface of the high aspect ratio hole; and

a layer of aluminum formed on the layer of tungsten to form a mirror like surface.

56. (New) The electronic system of claim 55, wherein the tungsten layer is formed using a silicon reduction process and a silane reduction process.

57. (New) The electronic system of claim 51, wherein the at least one optical waveguide has a cross-sectional diameter of at least about three times the cut-off diameter.

58. (New) The electronic system of claim 51, wherein the reflective material comprises a layer of aluminum material that lines the high aspect ratio holes.

59. (New) The electronic system of claim 58, wherein the layer of aluminum material has a thickness of approximately 300 angstroms.

60. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer;

at least one optical waveguide formed in a high aspect ratio hole that extends through the thickness of the at least one semiconductor wafer; and

a metallic mirror formed by a self-limiting deposition process on an inner surface of the high aspect ratio hole.

61. (New) The electronic system of claim 60, wherein the metallic mirror comprises at least one of tungsten and aluminum.

62. (New) The electronic system of claim 60, wherein the metallic mirror comprises:

a layer of tungsten formed on the inner surface of the high aspect ratio hole; and

a layer of aluminum formed on the layer of tungsten to form a mirror like surface.

63. (New) The electronic system of claim 62, wherein the layer of aluminum is formed by using Dimehtylaluminum hydride as a precursor and hydrogen as a carrier gas at a temperature of

about 250° Celsius and a pressure of about 5 Torr.

64. (New) The electronic system of claim 60, wherein the metallic mirror comprises a layer of aluminum formed on a silicide.

65. (New) The electronic system of claim 64, wherein the aluminum layer is formed using dimethylethylaminealane (DMEAA).

66. (New) The electronic system of claim 60, wherein an interior of the optical waveguide is filled with a material having an index of refraction greater than about 1.

67. (New) The electronic system of claim 60, wherein an interior of the optical waveguide is void.

68. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer;

at least one optical waveguide formed in a high aspect ratio hole that extends through the thickness of the at least one semiconductor wafer; and

a lining formed in the high aspect ratio hole to contain optical signals within the waveguide.

69. (New) The electronic system of claim 68, wherein the lining comprises least one layer of a highly reflective material to form a mirror-like surface.

70. (New) The electronic system of claim 68, wherein the lining comprises:

a layer of tungsten formed on the inner surface of the high aspect ratio hole; and

a layer of aluminum formed on the layer of tungsten to form the mirror like surface.

71. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer;

at least one optical waveguide formed in a high aspect ratio hole that extends through the thickness of the at least one semiconductor wafer; and

a lining formed in the high aspect ratio hole to substantially reduce loss of optical signals into the at least one semiconductor wafer and to substantially reduce photogeneration of carriers in the at least at least one semiconductor wafer.

72. (New) The electronic system of claim 71, wherein the lining comprises a metallic mirror formed by a self-limiting deposition process on an inner surface of the high aspect ratio hole.

73. (New) An electronic system, comprising:

a first semiconductor wafer including a first surface and a second surface opposite to the first surface;

a first integrated circuit formed in the first surface of the first semiconductor wafer;

a second semiconductor wafer including a first surface and a second surface opposite to the first surface, wherein the first surface of the second semiconductor wafer is bond to the second surface of the first semiconductor wafer;

a second integrated circuit formed in the second surface of the second semiconductor wafer; and

at least one optical waveguide formed in the first and second semiconductor wafers to transmit and receive optical signals between the first and second integrated circuits.

74. (New) The electronic system of claims 73, wherein the at least one optical waveguide comprises a high aspect ratio hole.

75. (New) The electronic system of claim 74, wherein the high aspect ratio hole comprises a highly reflective inner surface to contain optical signals within the waveguide.

76. (New) The electronic system of claim 73, wherein the optical waveguide comprises a metallic mirror lining an inner surface.

77. (New) The electronic system of claim 73, further comprising an optical transmitter and an optical receiver, each coupled to the optical waveguide and to one of the first and second integrated circuits.

78. (New) The electronic system of claim 77, wherein the optical transmitter comprises a gallium arsenide transmitter.

79. (New) The electronic system of claim 77, wherein the optical receiver comprises a silicon photodiode detector.

80. (New) An electronic system, comprising:

a first semiconductor wafer including a first surface and a second surface opposite to the first surface;

a first integrated circuit formed in the first surface of the first semiconductor wafer;

a second semiconductor wafer including a first surface and a second surface opposite to the first surface;

a second integrated circuit formed in the first surface of the second semiconductor wafer, wherein the first surface of the second semiconductor wafer is bond to the second surface of the first semiconductor wafer; and

at least one optical waveguide formed in the first semiconductor wafer to transmit and receive optical signals between the first and second integrated circuits.

81. (New) The electronic system of claims 80, wherein the at least one optical waveguide comprises a high aspect ratio hole.

82. (New) The electronic system of claim 80, wherein the high aspect ratio hole comprises a highly reflective inner surface to contain optical signals within the waveguide.

83. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer; and

at least one optical waveguide formed in the at least one semiconductor wafer and including a mirror-like interior surface.

84. (New) The electronic system of claim 83, wherein the at least one optical waveguide comprises a high aspect ratio hole formed through the at least one semiconductor wafer.

85. (New) The electronic system of claim 84, wherein the mirror-like interior surface comprises at least one layer of a reflective material formed on an inner surface of the high aspect ratio hole.

86. (New) The electronic system of claim 84, wherein the mirror-like interior surface comprises a layer of aluminum.

87. (New) An electronic system, comprising:

at least one semiconductor wafer;

a number of integrated circuits with at least one integrated circuit formed on the at least one semiconductor wafer;

at least one optical waveguide formed in the at least one semiconductor wafer and including a mirror-like interior surface;

an optical transmitter coupled to the optical waveguide; and

an optical receiver coupled to the optical waveguide..

88. (New) The electronic system of claim 87 , wherein the optical transmitter comprises a gallium arsenide transmitter.

89. (New) The electronic system of claim 87, wherein the optical transmitter comprises a silicon photodiode detector.

90. (New) The electronic system of claim 87, wherein the at least one optical waveguide comprises a high aspect ratio hole formed through the at least one semiconductor wafer.

91. (New) An integrated circuit, comprising:

at least one functional circuit formed on a wafer; and

at least one optical waveguides formed in a high aspect ratio hole that extend through the wafer.

92. (New) The integrated circuit of claim 91, further comprising:

a layer of highly reflective material formed to line an inner surface of the high aspect ratio hole.

93. (New) The integrated circuit of claim 91, wherein the optical waveguide is formed by an anodic etch that creates the high aspect ratio hole.

94. (New) An integrated circuit, comprising:

at least one functional circuit formed on a wafer;

at least one optical waveguide formed in a high aspect ratio hole that extend through the wafer; and

a layer of highly reflective material formed on an inner surface of the high aspect ratio hole.

95. (New) The integrated circuit of claim 94, wherein the layer of highly reflective material comprises at least one layer of a metal.

96. (New) The integrated circuit of claim 95, wherein the layer of highly reflective material comprises:

a layer of tungsten formed on the inner surface of the high aspect ratio hole; and

a layer of aluminum formed on the layer of tungsten.

97. (New) An integrated circuit, comprising:

at least one functional circuit formed on a wafer;

at least one optical waveguide formed in a high aspect ratio hole that extend through the wafer; and

a mirror-like layer including aluminum formed on an inner surface of the high aspect ratio holes.

98. (New) The integrated circuit of claim 97, wherein the mirror-like layer has a thickness of approximately 300 angstroms.

99. (New) The integrated circuit of claim 97, wherein the mirror-like layer is formed by a self-limiting deposition process.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on August 27, 2001, and the references cited therewith.

Claims 1 and 30 are canceled, and claims 45-99 are added; as a result, claims 45-99 are now pending in this application.

Information Disclosure Statement

Applicant respectfully requests that a copy of the 1449 Form, listing all references that were submitted with the Information Disclosure Statement filed with the application on July 18, 2000, marked as being considered and initialed by the Examiner, be returned with the next official communication.